

SCAVENGER HUNT



CIRCLE VOCABULARY AND SIMILAR CIRCLES

All Circles Are Similar: Find the Scale Factor

Two circles on every card · radius or diameter? · which way? · the cards check the answers

FREE

ANSWER

1.67

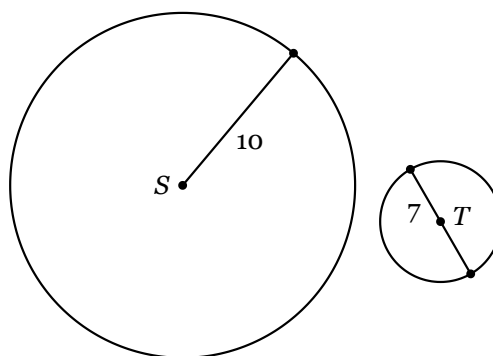
Translate circle S so its center lands on the center of circle T. Then dilate about that center.

What scale factor carries circle S onto circle T?

Write it as a decimal. Round to two decimal places if it does not stop.

Which circle moves? Its radius goes on the bottom of the fraction.

H



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1. **Tape the 16 cards around the room**, in any order. Each card has a large letter in its bottom left corner. Start each group at a *different* one of these eight cards: *H E K D L J G C*. Calculators, one per group.
2. **Say this once:** *“Check each segment. Is it a radius or a diameter? If a segment is a diameter, halve it to get the radius. The circle named first is the one that moves. Divide the other circle’s radius by its radius. Round to two decimal places, like 2.33. Then walk to the card with that answer at the top.”*
3. **Each group writes one line per card.** Eight right answers bring the group back to its first card.

16 cards	pages 3–10, one copy. There are two cards on each sheet. Cut the whole stack once.
Record sheet	page 11, one per student. It shows a radius and a diameter as pictures, and the rule.
Answers	pages 12–13, for you only. Do not put them up in the room.

Every card shows two circles drawn to scale. Each has one segment with its length: a radius (from the center to the circle) or a diameter (across the circle through the center). No word says which, so the student must look. On each card the circle named first, S in “What scale factor carries circle S onto circle T?”, is the circle that moves. The scale factor is the radius of the circle it lands on $\div$ the radius of the circle that moves. A calculator helps. This sheet uses these definitions: a radius and a diameter are segments, and the same words also name their lengths. Some textbooks use other definitions, so tell the class which ones this sheet uses.

Eight of the sixteen cards make the ring. A group reaches the other eight only by a wrong answer, but all the cards look the same. There are two mistakes. In the first, the student turns the factor upside down. In the second, the student uses a diameter as if it were a radius. Each lands on a card off the ring, which sends the group back to the card it got wrong. On one ring card the circles are congruent: circle Y has radius 5 and circle Z has diameter 10. The factor is 1, and the two circles are similar and congruent.

The check is the length of the group’s list. A clean run is **eight lines**. Each wrong answer adds two. Every card has a line in italics under the boxed rule. It tells a group that arrived by a wrong answer what to check. A group that arrived by a right answer skips it. Guessing does not work: no single rule, such as always dividing the larger number by the smaller, gets more than four of the cards.



This is the free lesson this activity came from. The worksheet, the full answers and the lesson plan are on it, at three levels of difficulty.
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ANSWER

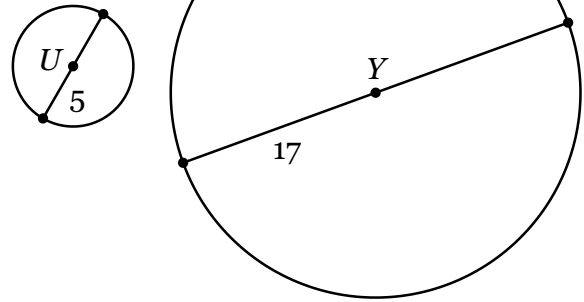
2

Translate circle U so its center lands on the center of circle Y. Then dilate about that center.

What scale factor carries circle U onto circle Y?

Write it as a decimal. Round to two decimal places if it does not stop.

Find the center dot. Does the segment start at it, or cross it?



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A

ANSWER

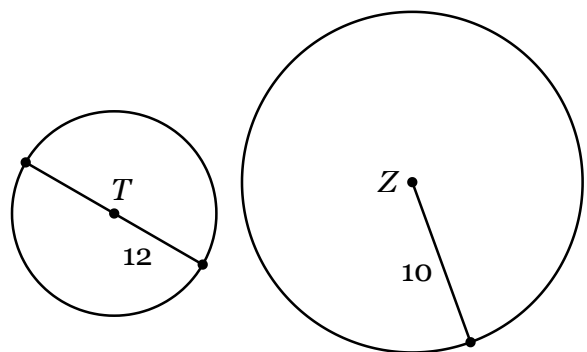
2.86

Translate circle T so its center lands on the center of circle Z. Then dilate about that center.

What scale factor carries circle T onto circle Z?

Write it as a decimal. Round to two decimal places if it does not stop.

The first circle in the question moves onto the second one.



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B

ANSWER

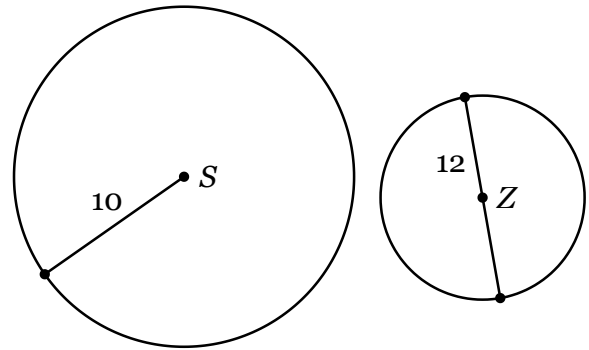
0.45

Translate circle Z so its center lands on the center of circle S. Then dilate about that center.

What scale factor carries circle Z onto circle S?

Write it as a decimal. Round to two decimal places if it does not stop.

Look at each segment. Is it a radius or a diameter?



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C

ANSWER

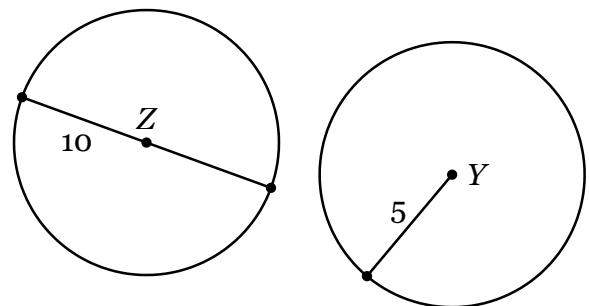
3.4

Translate circle Y so its center lands on the center of circle Z. Then dilate about that center.

What scale factor carries circle Y onto circle Z?

Write it as a decimal. Round to two decimal places if it does not stop.

Compare radius with radius. Does each segment pass through the center?



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D

ANSWER

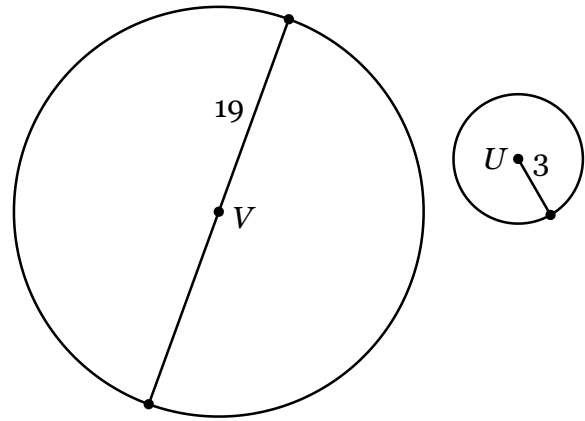
0.35

Translate circle U so its center lands on the center of circle V. Then dilate about that center.

What scale factor carries circle U onto circle V?

Write it as a decimal. Round to two decimal places if it does not stop.

A segment through the center is a diameter. Halve it to get the radius.



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E

ANSWER

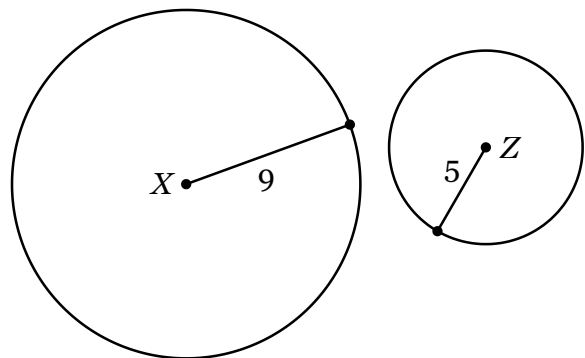
1.36

Translate circle Z so its center lands on the center of circle X. Then dilate about that center.

What scale factor carries circle Z onto circle X?

Write it as a decimal. Round to two decimal places if it does not stop.

Half of a diameter is a radius. Put only radii in the fraction.



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F

ANSWER

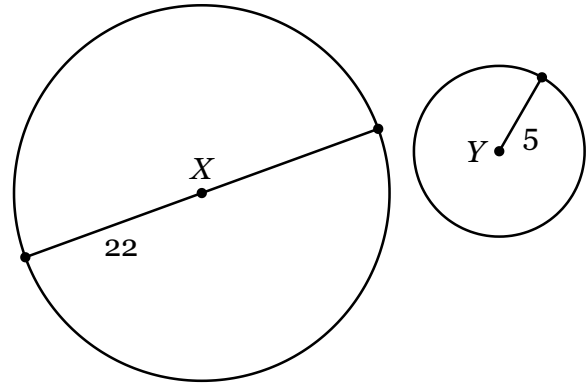
0.68

Translate circle X so its center lands on the center of circle Y. Then dilate about that center.

What scale factor carries circle X onto circle Y?

Write it as a decimal. Round to two decimal places if it does not stop.

New radius on top, old radius on the bottom. Check the order.



G

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ANSWER

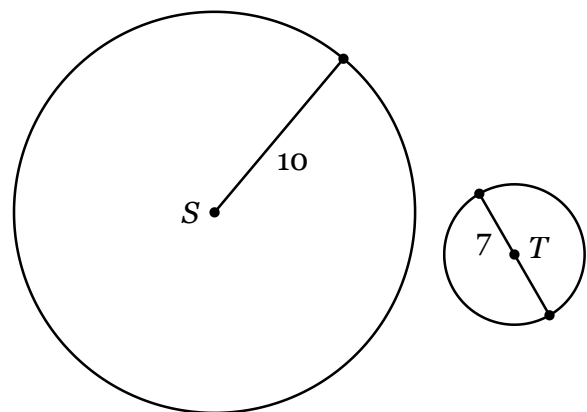
1.67

Translate circle S so its center lands on the center of circle T. Then dilate about that center.

What scale factor carries circle S onto circle T?

Write it as a decimal. Round to two decimal places if it does not stop.

Which circle moves? Its radius goes on the bottom of the fraction.



H

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ANSWER

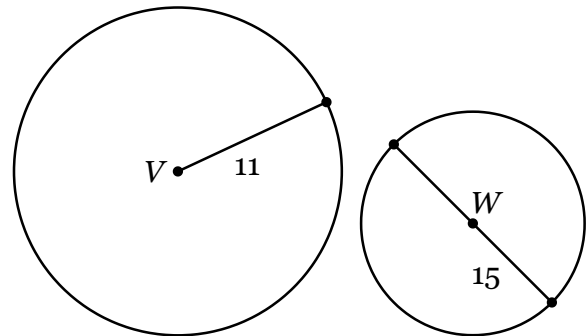
1.8

Translate circle V so its center lands on the center of circle W. Then dilate about that center.

What scale factor carries circle V onto circle W?

Write it as a decimal. Round to two decimal places if it does not stop.

A radius stops at the center. A diameter goes all the way across.



J

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ANSWER

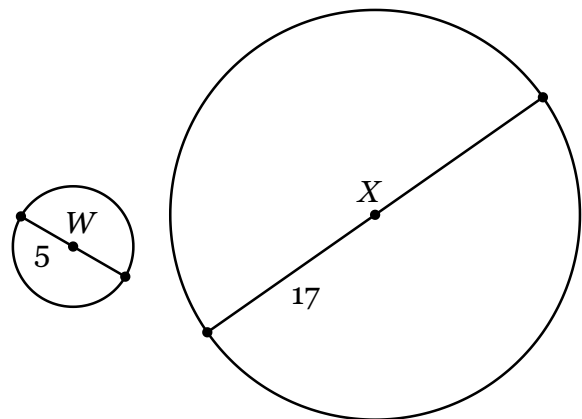
3.17

Translate circle W so its center lands on the center of circle X. Then dilate about that center.

What scale factor carries circle W onto circle X?

Write it as a decimal. Round to two decimal places if it does not stop.

Read the question once more. Which circle moves, and which circle stays still?



K

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ANSWER

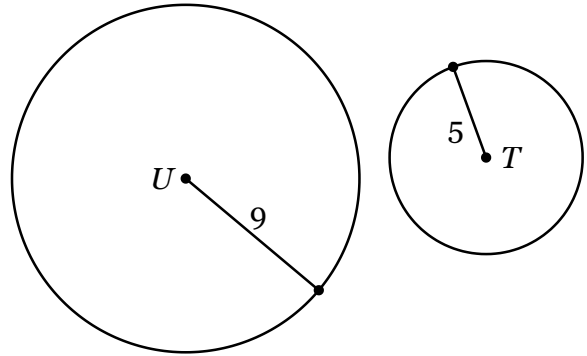
1

Translate circle T so its center lands on the center of circle U. Then dilate about that center.

What scale factor carries circle T onto circle U?

Write it as a decimal. Round to two decimal places if it does not stop.

A circle that grows has a factor more than 1. Does this one grow?



L

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ANSWER

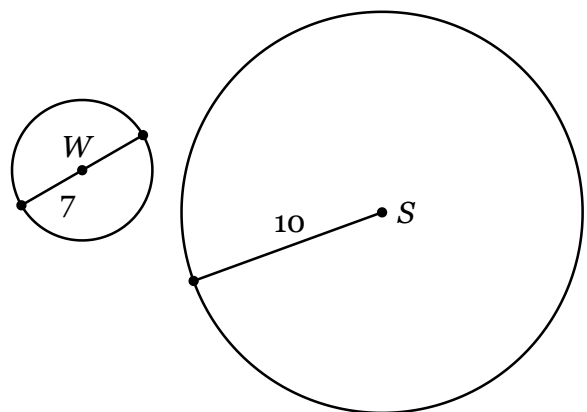
6.33

Translate circle S so its center lands on the center of circle W. Then dilate about that center.

What scale factor carries circle S onto circle W?

Write it as a decimal. Round to two decimal places if it does not stop.

Both numbers in the fraction are radii. Is either segment a diameter?



M

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ANSWER

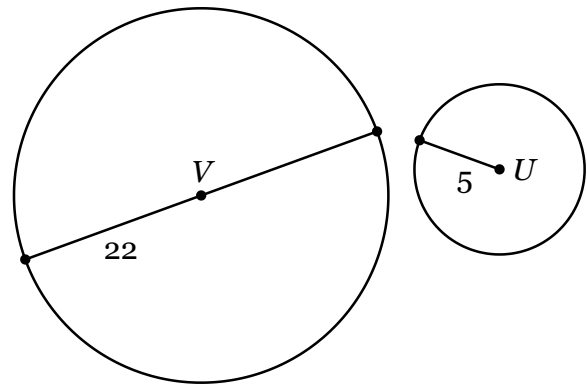
0.83

Translate circle V so its center lands on the center of circle U. Then dilate about that center.

What scale factor carries circle V onto circle U?

Write it as a decimal. Round to two decimal places if it does not stop.

Check each segment. Does it cross the circle from side to side?



N

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ANSWER

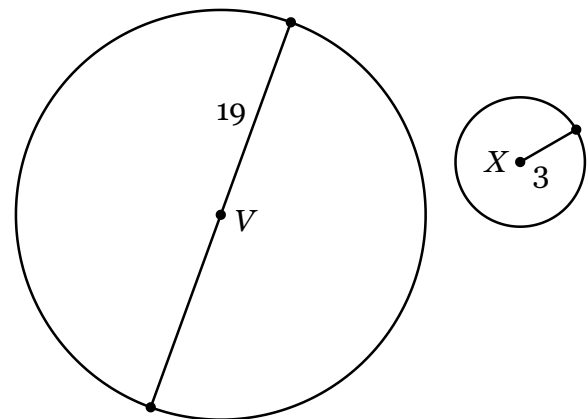
0.29

Translate circle X so its center lands on the center of circle V. Then dilate about that center.

What scale factor carries circle X onto circle V?

Write it as a decimal. Round to two decimal places if it does not stop.

Does the circle get bigger or smaller? Check the factor against that.



P

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ANSWER

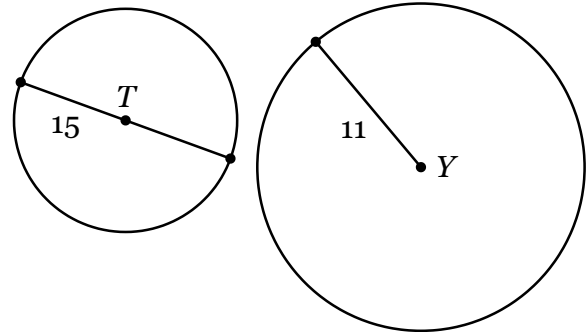
2.2

Translate circle Y so its center lands on the center of circle T. Then dilate about that center.

What scale factor carries circle Y onto circle T?

Write it as a decimal. Round to two decimal places if it does not stop.

Put the radius of the circle that moves on the bottom.



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Q

ANSWER

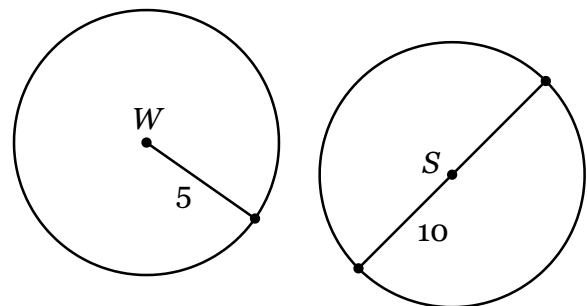
0.56

Translate circle W so its center lands on the center of circle S. Then dilate about that center.

What scale factor carries circle W onto circle S?

Write it as a decimal. Round to two decimal places if it does not stop.

Divide the radius of the second circle by the radius of the first.



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R

Scavenger Hunt — where I went

Similar circles

Name _____

Period _____

Date _____

For each card, write the radius of the circle that moves, then the radius of the circle it lands on, then the scale factor. **Round to two decimal places, like 2.33.** Then find the card with your answer at the top. A clean run is eight lines. Each card has a line in italics under the boxed rule. **If you are on a card because you went wrong, its line says what to check. If you were right, skip it.**



radius



diameter

A **radius** runs from the center to the circle. A **diameter** runs across the circle through the center. A diameter is twice as long as a radius.

To carry circle A onto circle B: translate A so its center lands on B's center. Then dilate about that center. **Scale factor = radius of B ÷ radius of A.**

Write the factor as a decimal. If it has more than two decimal places, round it to two: $7 \div 3 = 2.333\dots$ gives 2.33.

Card letter	Radius of the circle that moves	Radius of the circle it lands on	Scale factor
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

How does a little circle grow into a big circle?

Every number stands for a letter. Write the letter for each answer in the box above its number. Read the boxes you filled, left to right. **If they do not spell the answer, one of your answers is wrong.**

0.29 = C 0.35 = S 0.45 = C 0.56 = S 0.68 = A 0.83 = E 1 = L 1.36 = D 1.67 = E 1.8 = D 2 = A 2.2 = L 2.86 = P
3.17 = U 3.4 = P 6.33 = U

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0.29 0.35 0.45 0.56 0.68 0.83 1 1.36 1.67 1.8 2 2.2 2.86 3.17 3.4 6.33



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Scavenger Hunt — answers

For the teacher

The ring in order, with the answer found on each card. A group may begin anywhere on it. Wherever it begins, eight right answers bring it back to that card.

H (0.35) → E (3.17) → K (3.4) → D (1) → L (1.8) → J (0.68) → G (0.45) → C (1.67) → H

How does a little circle grow into a big circle? The answer is *SCALED UP!* It is read along the boxes of the record sheet, which run from the smallest number to the largest. Every factor is rounded to two decimal places when it does not stop.

Card	What the card shows	Answer, and why	The common wrong answer on this card, and why	Letter of its top
1 H	Carry circle S onto circle T. The radius of S is 10; the diameter of T is 7.	0.35. Circle S shows a radius of 10. Circle T shows a diameter of 7, so its radius is 3.5. Scale factor = radius of T ÷ radius of S = $3.5 \div 10 = 0.35$.	2.86. Turned upside down: $10 \div 3.5 = 2.86$. That carries T onto S. Circle T is smaller, so the factor must be less than 1.	E
2 E	Carry circle U onto circle V. The radius of U is 3; the diameter of V is 19.	3.17. Circle U shows a radius of 3. Circle V shows a diameter of 19, so its radius is 9.5. Scale factor = radius of V ÷ radius of U = $9.5 \div 3 = 3.17$.	6.33. The 19 on circle V is a diameter, used as if it were a radius: $19 \div 3 = 6.33$. The segment passes through the center, so the radius is half of it.	S
3 K	Carry circle W onto circle X. The diameter of W is 5; the diameter of X is 17.	3.4. Circle W shows a diameter of 5, so its radius is 2.5. Circle X shows a diameter of 17, so its radius is 8.5. Scale factor = radius of X ÷ radius of W = $8.5 \div 2.5 = 3.4$.	0.29. Turned upside down: $2.5 \div 8.5 = 0.29$. That carries X onto W. Circle X is bigger, so the factor must be more than 1.	U
4 D	Carry circle Y onto circle Z. The radius of Y is 5; the diameter of Z is 10.	1. Circle Y shows a radius of 5. Circle Z shows a diameter of 10, so its radius is 5. Scale factor = radius of Z ÷ radius of Y = $5 \div 5 = 1$.	2. The 10 on circle Z is a diameter, used as if it were a radius: $10 \div 5 = 2$. The segment passes through the center, so the radius is half of it.	P
5 L	Carry circle T onto circle U. The radius of T is 5; the radius of U is 9.	1.8. Circle T shows a radius of 5. Circle U shows a radius of 9. Scale factor = radius of U ÷ radius of T = $9 \div 5 = 1.8$.	0.56. Turned upside down: $5 \div 9 = 0.56$. That carries U onto T. Circle U is bigger, so the factor must be more than 1.	L
6 J	Carry circle V onto circle W. The radius of V is 11; the diameter of W is 15.	0.68. Circle V shows a radius of 11. Circle W shows a diameter of 15, so its radius is 7.5. Scale factor = radius of W ÷ radius of V = $7.5 \div 11 = 0.68$.	1.36. The 15 on circle W is a diameter, used as if it were a radius: $15 \div 11 = 1.36$. The segment passes through the center, so the radius is half of it.	D
7 G	Carry circle X onto circle Y. The diameter of X is 22; the radius of Y is 5.	0.45. Circle X shows a diameter of 22, so its radius is 11. Circle Y shows a radius of 5. Scale factor = radius of Y ÷ radius of X = $5 \div 11 = 0.45$.	2.2. Turned upside down: $11 \div 5 = 2.2$. That carries Y onto X. Circle Y is smaller, so the factor must be less than 1.	A
8 C	Carry circle Z onto circle S. The diameter of Z is 12; the radius of S is 10.	1.67. Circle Z shows a diameter of 12, so its radius is 6. Circle S shows a radius of 10. Scale factor = radius of S ÷ radius of Z = $10 \div 6 = 1.67$.	0.83. The 12 on circle Z is a diameter, used as if it were a radius: $10 \div 12 = 0.83$. The segment passes through the center, so the radius is half of it.	C

Scavenger Hunt — the cards off the ring

For the teacher

A group reaches these eight cards only by a wrong answer. The number at the top of each one is the wrong answer from one ring card. Its right answer is the number at the top of that ring card, so the group goes to the card it got wrong and tries it again. If the group makes the same mistake here, it goes to another card off the ring. So a second wrong answer never moves a group forward.

Card	What the card shows	Answer, and why	The common wrong answer on this card, and why	Letter of its top
B	Carry circle T onto circle Z. The diameter of T is 12; the radius of Z is 10.	1.67. Circle T shows a diameter of 12, so its radius is 6. Circle Z shows a radius of 10. Scale factor = radius of Z $\div$ radius of T = $10 \div 6 = 1.67$.	0.83. The 12 on circle T is a diameter, used as if it were a radius: $10 \div 12 = 0.83$. The segment passes through the center, so the radius is half of it.	P
M	Carry circle S onto circle W. The radius of S is 10; the diameter of W is 7.	0.35. Circle S shows a radius of 10. Circle W shows a diameter of 7, so its radius is 3.5. Scale factor = radius of W $\div$ radius of S = $3.5 \div 10 = 0.35$.	2.86. Turned upside down: $10 \div 3.5 = 2.86$. That carries W onto S. Circle W is smaller, so the factor must be less than 1.	U
P	Carry circle X onto circle V. The radius of X is 3; the diameter of V is 19.	3.17. Circle X shows a radius of 3. Circle V shows a diameter of 19, so its radius is 9.5. Scale factor = radius of V $\div$ radius of X = $9.5 \div 3 = 3.17$.	6.33. The 19 on circle V is a diameter, used as if it were a radius: $19 \div 3 = 6.33$. The segment passes through the center, so the radius is half of it.	C
A	Carry circle U onto circle Y. The diameter of U is 5; the diameter of Y is 17.	3.4. Circle U shows a diameter of 5, so its radius is 2.5. Circle Y shows a diameter of 17, so its radius is 8.5. Scale factor = radius of Y $\div$ radius of U = $8.5 \div 2.5 = 3.4$.	0.29. Turned upside down: $2.5 \div 8.5 = 0.29$. That carries Y onto U. Circle Y is bigger, so the factor must be more than 1.	A
R	Carry circle W onto circle S. The radius of W is 5; the diameter of S is 10.	1. Circle W shows a radius of 5. Circle S shows a diameter of 10, so its radius is 5. Scale factor = radius of S $\div$ radius of W = $5 \div 5 = 1$.	2. The 10 on circle S is a diameter, used as if it were a radius: $10 \div 5 = 2$. The segment passes through the center, so the radius is half of it.	S
F	Carry circle Z onto circle X. The radius of Z is 5; the radius of X is 9.	1.8. Circle Z shows a radius of 5. Circle X shows a radius of 9. Scale factor = radius of X $\div$ radius of Z = $9 \div 5 = 1.8$.	0.56. Turned upside down: $5 \div 9 = 0.56$. That carries X onto Z. Circle X is bigger, so the factor must be more than 1.	D
Q	Carry circle Y onto circle T. The radius of Y is 11; the diameter of T is 15.	0.68. Circle Y shows a radius of 11. Circle T shows a diameter of 15, so its radius is 7.5. Scale factor = radius of T $\div$ radius of Y = $7.5 \div 11 = 0.68$.	1.36. The 15 on circle T is a diameter, used as if it were a radius: $15 \div 11 = 1.36$. The segment passes through the center, so the radius is half of it.	L
N	Carry circle V onto circle U. The diameter of V is 22; the radius of U is 5.	0.45. Circle V shows a diameter of 22, so its radius is 11. Circle U shows a radius of 5. Scale factor = radius of U $\div$ radius of V = $5 \div 11 = 0.45$.	2.2. Turned upside down: $11 \div 5 = 2.2$. That carries U onto V. Circle U is smaller, so the factor must be less than 1.	E

Other mistakes lead to no card. A group might make both mistakes at once, divide the areas instead of the radii (which squares the factor), subtract the two radii, cut the decimal off instead of rounding it, or round to one decimal place. Its answer is then not the number at the top of any card.